SOIL SURVEY OF THE NORTH PLATTE AREA, NEBRASKA.

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DESCRIPTION OF THE AREA.

The North Platte area is situated in Lincoln County, Nebr. In shape it is a rectangle 26 miles long east and west and 18 miles north and south, having an area of about 470 square miles. It includes a little more than the south half of the North Platte quadrangle. It extends from the town of Hershey on the west to the town of Maxwell on the east, and 8½ miles north and 9½ miles south of the town of North Platte.

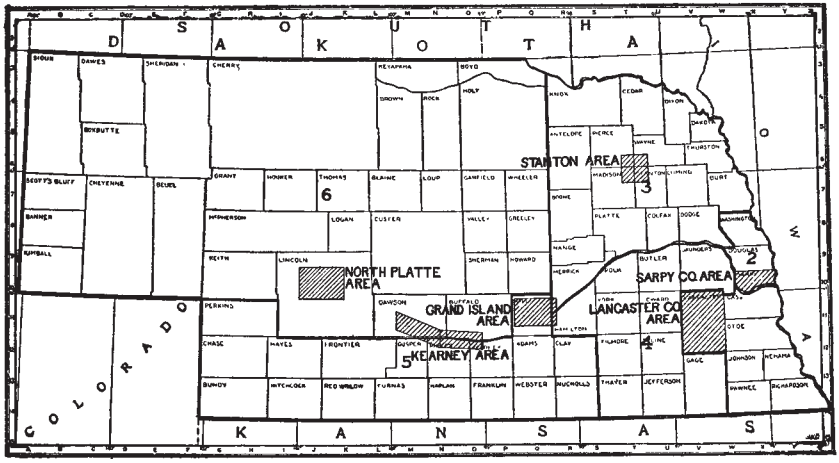

FIG. 27.—Sketch map showing location of the North Platte area, Nebraska.

North Platte, situated in the broad, level valley, has an elevation of 2,800 feet, and the upland is 200 to 400 feet higher. The sand-hills on the north are typical of this section, and many of them are 200 feet high. On the south side of the valley the surface of the upland is generally very rough, being cut by deep canyonlike gorges 50 to 300 feet or more in depth. In the eastern part of the area the bluffs rise abruptly to a height of 350 feet; the crest of the bluff becomes lower toward the west and in the extreme western part of the area there is a gradual slope from the edge of the valley to the

upland. Limestone is found outcropping in places along the edge of the bluff. In the southern part of the area the sandhills are much the same as those to the north except that they are not quite so rough.

The North and South Platte rivers drain the valley to the east. The fall is about 8 feet per mile. About 2 miles east of North Platte the rivers unite, forming the Platte River. There is considerable swampy land in the valley, which on the south is drained into the river through Beer and Fremont sloughs. The sandhills, because of their porous nature, absorb most of the rain. Whitehorse Creek on the north carries most of the underground water from the hills into the North Platte River. The loess is broken by canyons which are dry except during wet spells in the spring.

The country was settled by homesteaders who came from the adjoining eastern States, especially from Missouri. One of the first parties came from Michigan in 1871, but after 1880 there began a steady influx of settlers. The country, however, is now thinly settled, especially in the hills. North Platte, the principal town of the area, has a population of about 5,000 and is located near the center of the area. Hershey on the west and Maxwell on the east each have a population of nearly 200. A substation of the Nebraska Agricultural Experiment Station is located about 3 miles south of North Platte.

The trunk line of the Union Pacific Railroad, which passes through Maxwell, North Platte, and Hershey, furnishes very good transportation facilities. A survey for a proposed line of the Burlington route, which will pass through North Platte, has been made. The country roads are good.

North Platte affords a good local market for fruit, vegetables, and dairy and poultry products; in fact, the demand for these commodities exceeds the supply. Most of the cattle are not fattened here, but are shipped to Omaha, which is the chief live-stock market, where they are sold as feeders. Considerable quantities of hay are shipped to Omaha and Denver.

CLIMATE.

The climate of the area is characteristic of western Nebraska, the temperature for the year averaging about 48° F. December, January, and February have an average temperature of 25° F. The winters are dry; consequently the cold is not felt severely. July and August have an average temperature of 73° F. Although the days are warm, the nights are always cool and there is an almost continual breeze, due mainly to the fact that the country is so open. There is a great deal of sunshine, two hundred days of the year being clear.

The heaviest rainfall is in the growing season, April, May, June, July, and August, mostly in showers from 0.08 to 0.25 inch, so the

greater part of the rainwater is absorbed by the soil. Generally there are only one or two rains in a season when the precipitation is more than an inch. Hail is common but not often injurious.

The following table, compiled from the records of the Weather Bureau station at North Platte, gives the more important data relating to the climatic conditions of the area.

Mean monthly and annual temperature and precipitation, the absolute maximum and minimum temperature, the total precipitation for the wettest and driest years, and the depth of snow at North Platte, Nebr.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
January	24	70	−35	0.4	0.3	1.2	3.5
February	25	74	−35	.4	.3	1.4	6.0
March	35	86	−21	.8	1.7	.5	6.0
April	49	93	12	2.1	1.6	3.1	.0
May	59	97	25	2.8	.4	4.1	.0
June	68	102	33	3.2	3.5	7.5	.0
July	74	107	41	2.6	2.4	1.3	.0
August	72	103	40	2.3	.2	4.5	.0
September	63	101	21	1.4	.1	1.1	.0
October	50	90	9	1.0	.6	3.5	1.8
November	35	81	−25	.4	Trace.	.4	2.2
December	27	70	−30	.5	Trace.	1.4	2.7
Year	48	107	−35	17.9	11.1	30.0	22.2

The average date of last killing frost in spring is May 9, and of the first in the fall September 20, which gives a growing season of about 133 days.

AGRICULTURE.

The agriculture of this section began to make rapid development between 1880 and 1885. In 1880 there were in Lincoln County 47,838 acres in farms, of which 37,660 acres were improved. In 1890 the total acreage in farms had increased to 343,108 acres, of which 204,411 were improved. In the next ten years 258,885 acres more were put into farms. In 1890 the value of farms and buildings was nearly seven times what it was in 1880, or $3,259,330 as against $469,403. From 1890 to 1900 the value of farms and buildings increased 20 per cent, and since the last census there has been a steady increment in value.

Irrigation started with the completion of the North Platte Canal in 1884. This was one of the first irrigation canals constructed in the State. Most of the other ditches were dug in the years 1894, 1895, and 1896.

The early agriculture consisted almost wholly of stock raising. For years the uplands were broad, unfenced ranges where the cattle grazed at will. As the land was taken up by homesteaders it became divided into tracts of 160 acres or more. Houses were built and crops planted. Wheat was one of the principal crops of the early settlers; corn, however, has always been the leading cultivated crop. The live stock was of very poor quality during the early agriculture of the area.

With the completion of the irrigation ditches and the separation of the land into small farms or ranches, the agriculture changed noticeably. Stock raising has remained the leading industry, wheat has been grown less extensively in comparison with other crops, the area planted to corn has increased, while alfalfa, sugar beets, and brome grass have been introduced.

Spring wheat was grown rather extensively for a while, but experience has shown that it is not as productive as the winter varieties, and consequently its cultivation has nearly ceased. Alfalfa was introduced about 1898 and has proved a very valuable and successful crop on the soils that are adapted to it. Sugar beets have been grown quite extensively for the last five or six years until the present season. With the closing of the sugar factory at Ames there is no market for this crop nearer than Grand Island, and few farmers consider it profitable to ship beets this distance. This industry will undoubtedly be taken up again as soon as a suitable market is available. Sorghum, kafir corn, and millet are grown for forage, and a limited acreage of barley, rye, and emmer (speltz) is planted. Irish potatoes were grown quite extensively for a number of years on the North Platte loam and for a time gave good results, but gradually the yield became less and for the last few years they have been produced only for home consumption. Much of the valley is still in meadow, its position is low, and poor drainage renders cultivation impossible.

Modern farm machinery is in general use in this area. The one object always kept in mind in the management of farms is the saving of labor. It is the common practice to use four horses in plowing and cultivating, the gang plow and the two-row cultivator being commonly used. Six horses are often hitched to one harrow. Modern harvesting machinery is used in gathering the grain, while the most perfected labor-saving implements are employed in the hay fields. In 1900 the farm machinery of the county was valued at $228,200.

The live stock is of good quality, especially that found on the ranches in the Platte River Valley. Some blooded cattle and hogs are bred. There are also many fine horses and some mules raised in the area. The value of the live stock in Lincoln County in 1900 was $1,929,551.

The farmers have in a general way adapted the crops to the different soils, but have paid practically no attention to crop rotation.

The sandy uplands have generally been left as ranges, although occasional attempts have been made to cultivate them, with the result that the land has been injured by wind erosion except in the heavier depressions. Alfalfa is usually sown on soil well suited to its growth. There have been occasional failures on land too poorly drained for this crop or where alkali has accumulated in large enough amounts to be injurious. Manure is thrown away rather than applied to the crops, while straw and cornstalks are commonly burned. With the exception of these general wasteful methods, and the lack of care given to the farm machinery, the agricultural methods are well adapted to the present conditions.

During the harvesting season $2 to $2.50 a day is not an uncommon wage for farm hands. Farm laborers when hired by the month receive about $25 to $30 and board.

Most of the farms in the valley range from 160 acres to one section in size. Larger tracts are occasionally held by one individual. The sandy uplands are generally owned in tracts of from 1 to 5 square miles in extent. It is of interest to note that the average size of the farms of the county decreased from 402 to 267 acres between 1880 and 1890, at which time the valley was being put under cultivation and the large cattle ranches were separated into smaller farms. Much of the broad, open range on the upland was divided into rather large cattle ranches between the years of 1890 and 1900, thus increasing the average size of the farms of the county to 412.9 acres in 1900.

Possibly half of the farms in the valley are operated by their owners. In 1900, 54.2 per cent of the farms of the county were rented. Where rented, either the cash or share system is followed, generally the former, since the greater part of the land is utilized for grazing or hay production. Practically all the sandy upland is either used as grazing land or else left as open range. It is impossible to rent this character of land at present. Where the valley land is rented for a share of the grain, the tenant usually gives one-third of the crop. The better valley land, adapted to corn, alfalfa, and sugar beets, rents for $3 to $5 an acre.

The value of the farm land of the area varies considerably. The valley may be divided into farming land and hay or grazing land. The former is valued at $15 to $30, the latter at $35 to $70 an acre. The upland north of the valley sells for $1.50 to $4 an acre. The south upland varies in value, the sand hills selling for $2 to $5, the hilly lands for $8 to $12, while the level table-land brings $25 to $40 an acre.

The farmers are generally thrifty and show intelligence in their farm work. Better cultural methods could frequently be employed. All cultivation should have for its main object the conservation of

moisture. Shallow and frequent stirring of the soil in order to maintain a good mulch, so that the evaporation of the soil moisture will be kept at a minimum, is to be recommended especially where irrigation is not practiced, and even in the case of irrigated lands the lessening of surface evaporation is very essential in preventing the accumulation of alkali in the surface soil. A more systematic rotation could well be employed on many of the farms. There is also a chance for the further and better adaptation of crops to the different soil types. Practically no valuation is placed on barnyard manure at the present time. The common practice of using it to fill up ditches and mudholes along the roads should cease and the manure should be placed on the fields. The soil should receive more careful treatment and greater care should be employed to maintain its productiveness. Any of the soils in the area will deteriorate with constant cropping, especially where the same crop is grown year after year.

SOILS.

The soils of the area are naturally divided into two distinct groups, those occupying the upland on the east side of the Platte Valley, and those situated in the valley itself. These two groups not only differ in having soils of widely different character, but the types are of a distinctly different derivation and age.

The upland north of the river is made up of sand dunes and forms part of that vast area of the State known as the sand-hill district. These sand hills reach an elevation of nearly 3,200 feet at the northern edge of the survey, while the individual dunes have a height of 200 feet or more. The greater part of this sand owes its origin to the Arikaree formation. This is a division of the later Tertiary following the White River group. During this period large quantities of debris were washed down from the mountains and deposited to the eastward, forming a rather flat, sandy, alluvial fan. Later the streams are supposed to have deposited a thin mantle of sands of the Ogalalla formation of the late Pliocene epoch.[a] These sand hills are of recent origin and have been formed by aeolian agencies. The sand hills south of the river are of similar formation; they are not, however, of as rough a topography and they have apparently been influenced somewhat by the loess which borders them on the north.

The loess, which occupies the south bluff of the valley, is of Quaternary formation. It is the continuation of the great loess sheet covering the eastern section of the State. In the east part of the area, south of the town of Maxwell, this loess is of great thickness, apparently reaching the depth of 200 to 300 feet or more. To the west it becomes thinner,

[a] N. H. Darton, Professional Papers No. 17, U. S. Geological Survey, 1903.

the Ogalalla limestone underlying it being exposed in large areas south of the town of North Platte. From this point west the loess forms a rather thin sheet along the crest of the bluff and extends only 2 or 3 miles, where it gives way to the sand-hill formation which probably overlaps the loess for some distance. The origin of this loess formation is undoubtedly associated with the action of the Platte River. It has been formed subsequently to the glaciation of the eastern section of the State, and owes its origin very probably to an old deposit of the Platte River which has been influenced by aeolian forces. Generally this loess is badly eroded, being cut by numerous canyonlike ravines 100 to 300 feet deep, but there are a few rather level areas. The surface soil in the latter areas contains much more organic matter and is of a slightly more silty nature, while the subsoil carries considerable clay in the lower areas.

The Ogalalla formation which is exposed above the loess gives rise to small patches of Rough stony land. These areas are of a very stony and somewhat argillaceous nature, though considerable loess is mixed with the surface.

The soils of the valley are of recent alluvial formation and are underlain at varying depths by river sands and gravels. Just below the bluffs occupying both sides of the valley is found soil which has washed from the uplands. Along the south side this deposit has a width of one-half to 1½ miles and closely resembles loess, while on the north edge of the valley it is much more sandy and seldom over one-half to three-quarters of a mile wide. Bordering this is generally found a strip of silt loam from a quarter to 1 mile in width. This silt appears to have been deposited in old channels where the current was very slow. This deposit varies from 2 to 5 feet in thickness and is directly underlain by river sands and gravels. The lower swampy areas of this type have a large amount of partly decomposed vegetable matter mixed with the surface foot and give rise to areas of Muck. Between this silt and the river, and occupying nearly the same level, is a loamy soil 12 to 24 inches deep, underlain by sand and gravel. This soil has been deposited in a more rapidly moving current. The higher portions of the valley proper, which may be considered second bottom, form the oldest of the alluvial formations, and consist either of a loam soil with a heavy sandy clay subsoil, or a soil having the texture of a sandy loam or loamy sand throughout the profile. The latter soil, where immediately adjoining the rivers, frequently owes its origin to the sand blowing from the river beds during dry seasons.

There is some alkali found in the valley soils. Generally where it has accumulated in sufficient quantity to be injurious to crops it is only found in small areas.

Twelve types of soil were mapped in the North Platte area. The name and extent of each type are given in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Dunesand	140,352	46.7	Laurel sandy loam	10,048	3.3
Finney fine sandy loam	40,128	13.3	Gannett fine sand	8,448	2.8
Laurel loam	24,768	8.2	Riverwash	4,672	1.6
North Platte loam	23,936	8.0	Muck	3,264	1.1
Laurel gravelly loam	16,448	5.5	Rough stony land	1,344	.4
Osgood fine sandy loam	16,320	5.4	Total	300,736	
Finney loam	11,008	3.7			

FINNEY FINE SANDY LOAM.

The soil of the Finney fine sandy loam, to a depth of 6 to 10 inches, consists of a very light-brown to a gray very fine sandy loam. The subsoil is of practically the same texture and differs from the surface in that the humus content is less. In the more broken areas even this difference is hardly apparent. Because of this similarity there is no marked dividing line between the surface soil and subsoil. Throughout the profile this soil consists of a loesslike fine sandy loam with a characteristic silty feel so common to much of the loess along the rivers of the Central States.

This type of soil extends through the area from east to west, occupying the crest of the south bluff of the Platte Valley, and having an average width of 3 to 4 miles. It gradually widens toward the east and at the same time becomes of a finer texture, frequently merging into a silt loam at the eastern border of the area. To the southward it merges gradually into the Dunesand, where naturally the type becomes very sandy.

The area occupied by this type presents a very rough and broken topography. In the western section of the survey the bluff slopes rather gently toward the valley, but it becomes gradually steeper and more rugged to the east, where it rises very abruptly to a height of over 300 feet. The type is, as a rule, too rough and broken to be put in cultivation. The loose, porous structure of this type allows the water to pass readily down through it, but at the same time it is very susceptible to erosion.

The Finney fine sandy loam has been formed from the loess deposit, which varies considerably in depth, being perhaps 10 to 30 feet deep in the western half of the area, and increasing apparently to 200 to 300 or more feet near the eastern border. In many places along the bluff south and southwest of North Platte the underlying limestone is exposed, but in the eastern section, where the ravines have cut down as deep as 350 feet, there is no rock to be seen.

The Finney fine sandy loam is naturally prairie and is covered with a good growth of wild grass, except on the very steep slopes, where the vegetation becomes so scanty that there frequently is hardly enough to hold the soil in place. Very little of the type can be put under cultivation. The more level areas are sometimes cultivated, but on account of the porous subsoil and the small amount of humus in the surface soil the crops are easily affected by drought. This droughty nature of the soil, together with the light rainfall of this district, makes it advisable to utilize this soil type mainly as pasture, though fair crops of corn and wheat can be produced on the more level areas in a very favorable year. It is primarily a type adapted to grazing, and this seems the best means of utilizing it at the present time. It is valued at from $5 to $15 an acre.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Finney fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
16820, 17763.....	Soil.....	0.1	0.3	0.3	10.0	48.6	35.1	5.5
16821, 17764.....	Subsoil.....	.1	.1	.1	4.7	62.0	27.5	6.0

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17763, 3 per cent; No. 17764, 3.86 per cent; No. 16820, 2.32 per cent; No. 16821, 3.95 per cent.

FINNEY LOAM.

The surface soil of the Finney loam is a brown loam to very fine sandy loam with an average depth of about 14 inches. The subsoil is a grayish-yellow to chocolate-colored heavy silty loam or light clay loam. In most cases the texture of this subsoil becomes lighter below 24 or 30 inches, the heavy stratum having a thickness of only 12 to 18 inches. On the table-lands between the canyons in the eastern part of the area this clayey stratum is almost entirely absent. Throughout the profile this type contains larger quantities of fine and very fine sand than is generally the case in types derived from the loess in the eastern part of the State. It differs from the Finney fine sandy loam in that it has a deeper and a darker brown surface soil, which contains much more humus and is generally of a finer texture, while the subsoil runs much heavier in most cases than that of the fine sandy loam. It is commonly referred to as "hard land" in this section of the State.

The Finney loam is confined to the south and southeast sections of the area, occupying the level to gently rolling parts of the uplands. The largest area is in Plant Township and is locally known as the "Jackmorrow Flats." The type is rolling enough in most cases to

give excellent natural drainage. There is an occasional depression to be seen where water accumulates during a heavy rainfall and covers the surface for a few days. The soil is seldom rolling enough to wash badly and is practically all suitable for cultivation.

This soil, like the preceding one, is formed from the loess deposit. The characteristics which distinguish it from the Finney fine sandy loam are due more to the present topographic and drainage features than to any difference in the material from which it is derived. The heavy substratum has increased the water-holding capacity of the type so that it has produced heavy growths of prairie grass for many years, and thus a large quantity of organic matter has been accumulated in the surface soil.

Like the Finney fine sandy loam, this soil was naturally open prairie supporting a good growth of prairie grass, including the buffalo grass and grama. This is a very productive soil and adapted to a large diversity of crops. The crops are held in check and their growth controlled more by the moisture supply than by the fertility of the soil. The cereals, including corn, wheat, and oats, are well adapted to this type. Alfalfa, clover, brome-grass, and fescue are crops that will do well, though frequently they are injured by drought.

Corn and wheat are the principal crops grown. Corn yields from 25 to 40 bushels per acre or even more unless it has suffered from lack of moisture. Wheat yields from 15 to 35 bushels, with an average of perhaps 25 bushels in favorable years. Oats give fair yields, but are not extensively cultivated. Alfalfa yields 2 to 3 tons to the acre, and is the only legume grown on this soil. Probably 50 per cent of the type is still in pasture. These pastures are very productive and in most seasons 3 acres are sufficient to support one steer.

The same cultural methods are employed on this type as on the types in the valley. The farmers on the Finney loam must depend upon the rainfall for their water supply, since there is no available water for irrigation. Frequent and shallow cultivation is to be recommended. The soil should be stirred as soon as practicable after a rain in order to form a surface mulch to prevent the evaporation of moisture absorbed by the soil. Fall plowing would be a good practice on this type, since it is seldom rolling enough to wash. Early fall plowing and possibly subsequent stirring with a harrow or disk would enable the fall and winter rains to permeate the soil and in this way moisture would be conserved for the coming crop. In short, it would be well to employ the most perfected methods of dry-land farming, for, although there has been sufficient rainfall the last few years to produce large crops with no especial attention being paid to the conservation of moisture, it is certain that in most years crops will suffer in this section of the country unless care is taken to utilize the rainfall in the most economical manner. This type of soil is sel-

dom fertilized, even the farm manure being commonly left to decay in the barnyard or else is hauled away and dumped into some ditch or waste place.

The farmers value this soil at $20 to $40 an acre, the average valuation being about $25.

The following table gives the average results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Finney loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
16822, 17767.....	Soil.....	0.1	0.1	0.1	4.3	45.0	39.9	10.5
16823, 17768.....	Subsoil.....	.0	.1	.2	5.2	50.4	36.9	7.1

DUNESAND.

The Dunesand consists of a rather fine-textured, yellowish-gray sand 36 inches in depth. The surface 6 or 8 inches contains a small accumulation of organic matter which gives it a slightly darker color. There are numerous depressions scattered here and there through this type, and in these lower areas the surface soil contains more organic matter and is of a more loamy nature. In the very lowest parts of these depressions the surface few inches may be a sandy loam.

This is by far the most extensive soil type in the survey. It occupies all the upland north of the valley and a large area is found on the south side bordering the loess deposit. This type presents the typical sand-hill topography of western Nebraska. It consists of a monotonous continuation of sand dunes, with an occasional depression or basin between. These hills are frequently 150 to 200 feet in height. There is no drainage developed in this region, as the sand is so porous that the rain water is readily absorbed by the soil. Whitehorse Creek, which cuts back into the sandhill region south of the river, is fed by springs and probably receives through underground channels the drainage of a rather large area of this type.

The accumulation of sand which gives rise to this soil is derived largely from the Arikaree formation. Darton suggests that this sand owes its origin in part to the remains of the early Pleistocene age or to the extension of the Equus beds of loess.[a] The present dune-like topography is due to subsequent æolian forces. Occasional blowouts may be seen in this type and until the last few years of heavy rainfall it was drifting badly in many places. At the present time, however, it supports a scanty growth of bunch-grass, yucca, cactus, and several varieties of wild legumes, which hold the soil in

[a] N. H. Darton, Professional Papers No. 17, U. S. Geological Survey, p. 15. 1903.

place. Whenever too heavily pastured or cultivated the sand starts blowing about and great difficulty is experienced in getting it back into grass.

It would seem that grazing will be the only profitable means of utilizing this type. Small areas in the depressions are planted to corn and in favorable years as much as 20 bushels per acre is produced, but many seasons are so dry that the crop is a total failure. Wild hay is occasionally cut from these depressions, and the growing of alfalfa is sometimes attempted, but with little success. Twenty to forty head of cattle are pastured to the section. During the summer months much of the soil will support as many as forty head, but in winter half this number will frequently suffer and often require the pasture to be supplemented with hay and sometimes corn. The area of Dunesand south of the river is more level and not quite as sandy as that on the north and consequently supports a better growth of grass.

In the utilization of Dunesand care should be taken not to overstock the ranges, for, when too heavily pastured, the surface is liable to start blowing. For the same reason the hills should never be broken and care should be employed in the tilling of the depressions, since the surface is very liable to start drifting even in these basin-like areas.

The Dunesand is valued at $1.50 to $3 an acre. Areas owned by the railroad may be purchased for $2.25 an acre.

The results of mechanical analyses of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Dunesand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17781	Soil	0.5	7.2	10.0	41.8	32.4	5.1	3.8
17782	Subsoil	.1	4.9	6.4	40.6	37.1	6.8	4.4

OSGOOD FINE SANDY LOAM.

The soil of the Osgood fine sandy loam to a depth of 12 to 18 inches is a light-brown to brown very fine sandy loam. It contains a large amount of silt and frequently grades into a loose-structured silt loam containing considerable fine and very fine sand. The subsoil to a depth of 36 inches consists of a grayish-yellow very fine sandy loam of practically the same texture as the surface soil. The type is less sandy in the eastern part of the area, while in the western part the subsoil is somewhat heavier, resembling that of the Finney loam.

The Osgood fine sandy loam forms a continuous strip across the area from east to west along the south edge of the valley and extends

from the foot of the bluff a mile or more into the bottom land. It is nearly identical with the Finney fine sandy loam, from which it has been formed, and represents merely the upland loess washed into the valley and deposited so as to form a kind of a low, second bottom-land terrace along the south side of the valley. It presents a nearly level surface with a gradual slope to the north. It is not subject to overflow, and though rather level its porous structure gives it perfect drainage.

In the western part of the area there is no sharp bluff line on the south side of the valley, but the bluff slopes gradually down to the low, flat bottom land. In this case the Osgood fine sandy loam occupies a higher terrace and assumes a somewhat different character, being, as before mentioned, more like the Finney loam. In the extreme eastern part of the area the type is found occupying two distinct terraces. Here the streams have carried away enormous quantities of loess from the upland in past years. There seems to have been formed a deep deposit which was subsequently partly eroded by the Platte River. The river has later swung back north, and that portion of the terrace that was removed has been replaced by more recent wash from the bluff, but this deposit has not reached the depth of the older one. This later-formed terrace is of a rather silty nature and the surface soil is deeper than is characteristic ofthe type.

Generally this wash is not strongly alkaline, but in some places, especially near the outer edge, alkali occurs in large enough quantities to injure the crops. Calcium carbonate concretions and small chips of limestone are scattered through the soil adjacent to the areas of Rough stony land.

One of the most productive soils of the area, the Osgood fine sandy loam is well adapted to the common grain crops, such as corn, wheat, and oats. It is an excellent alfalfa soil, giving from three to four cuttings annually and yielding on an average 4 tons or more to the acre. Beets seem especially well adapted to the soil. Brome grass and fescue should both produce heavy yields of hay. Practically all these crops are grown at the present time. Corn is probably the leading cereal and yields from 25 to 60 bushels, with an average of about 40 bushels per acre in favorable seasons. Wheat averages 20 to 25 bushels, oats 35 to 45 bushels, and sugar beets 15 tons per acre. Some emmer (speltz) is grown and gives good yields. Much of the type is still in pasture, the native sod never having been broken. These pastures are of fine quality, 40 acres generally being sufficient for fifteen to twenty steers. Practically the same cultural methods are employed on this type as on the Finney loam. Corn is universally listed and receives about three cultivations. Some farmers harrow the corn once or twice during early growth. This is a prac-

tice that can be recommended for more general use. Modern haymaking machinery is employed in the alfalfa fields. The irrigation ditch which follows the base of the bluff nearly to the east limit of the area surveyed would, if in good condition, afford a means of supplying water to practically all of this soil. This ditch has been neglected, however, the last few years, and at present is not being used.

Some of the best improved farms in the area are to be found on this soil. The farm buildings are generally very good for a newly settled country, and gradual improvement is being made in this respect. The type is valued at $30 to $50 or more an acre, the average value being not far from $40.

The following table gives the average results of mechanical analyses of this soil:

Mechanical analyses of Osgood fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17783, 17787.....	Soil.....	0.0	0.2	0.1	5.1	37.4	51.6	6.1
17784, 17788.....	Subsoil.....	.1	.1	.2	3.8	34.0	55.2	6.1

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17784, 1.27 per cent; No. 17788, 1.54 per cent.

NORTH PLATTE LOAM.

The surface soil of the North Platte loam is a brown loam with an average depth of about 14 inches. On the higher areas this surface is more of a sandy loam, while in the lower, more level places it becomes a heavy loam. Small amounts of gravel commonly occur scattered through the surface soil. The subsoil consists of a yellowish-brown to drab clay loam or heavy sandy loam. When dry this subsoil becomes very hard and is sometimes incorrectly called hardpan. Generally the texture becomes lighter below 24 to 30 inches, the clayey stratum being from 12 to 16 inches in thickness.

This soil is confined to the valley and is the principal type found between the rivers from North Platte to Hershey. It also occurs in small areas north of the North Platte River and on Brady Island. Adjoining the river near Maxwell there occurs a rather large body of this soil.

Probably of older formation than the other valley types, the North Platte loam owes its origin to alluvial deposits of the rivers, and occupies areas higher than the Laurel gravelly loam or Laurel loam. Very often it is separated from these two types by terraces 6 to 10 feet in height. The soil represents the old valley floor which has been cut away by the rivers in more recent times and replaced at a lower level by deposits of different character, thus in most cases leaving the North Platte loam a true second bottom. The topography is of a

level character, and except in occasional depressions the drainage is good.

The North Platte loam frequently contains injurious amounts of alkali, though it is only in small areas that the concentration of salt is great enough to affect seriously the more resistant crops. Considerable of the type, however, has from 0.05 to 0.20 per cent of alkali in the surface 3 feet in dry seasons. Because of this accumulation of salt it is difficult to get a stand of alfalfa in some instances.

This soil is adapted to a wide diversity of crops. Corn and oats will produce well, while wheat will probably be found to yield less proportionately to these other two cereals. Alfalfa is well adapted to this soil and sugar beets should produce good yields even in the areas containing the most alkali. Fruits and vegetables should prove fairly successful where the soluble salts have not accumulated in large enough quantities to be injurious.

Corn and alfalfa are the principal crops. Alfalfa yields from 3 to 5 tons, and corn from 40 to 60 bushels per acre in favorable seasons or where irrigated. Sugar beets were extensively grown at one time and gave excellent yields of 15 to 25 tons to the acre where well tended. Wheat also was grown extensively, but its acreage has decreased materially within recent years. For a time potatoes were produced commercially, but now only to supply home consumption. Fruit produces fairly well, and apples, pears, and cherries are all grown to a limited extent.

The same cultural methods are employed on this type as on the Osgood fine sandy loam. Irrigation is more extensively practiced, however, and the ditches have been maintained in better condition during the recent seasons of abundant rainfall.

Many well-improved farms are to be found on this soil. Substantial and comfortable farm buildings are common. The North Platte loam and Osgood fine sandy loam have by far the best farm improvement of the area. The North Platte loam is valued at from $30 to $75 an acre. The higher areas, which are practically always free from injurious accumulations of alkali and which have rights to a sufficient supply of water, can not be bought for less than $50 to $60 an acre.

The following table gives the results of the mechanical analyses of fine-earth samples of the soil and subsoil of this type:

Mechanical analyses of North Platte loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17771	Soil	0.7	5.3	2.8	11.4	26.1	41.8	12.0
17772	Subsoil	1.3	5.8	3.1	10.0	16.8	36.5	25.8

The following sample contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17772, 0.73 per cent.

LAUREL LOAM.

The surface soil of the Laurel loam to a depth of about 12 inches consists of a brown to dark-brown silt loam which frequently contains large amounts of organic matter. The subsoil is a mealy, slate-colored to gray silt loam extending to a depth of at least 30 inches, below which it often becomes sandy, and frequently the underlying river gravels are encountered above 36 inches. Where the soil is very shallow sandy or gravelly material may be found at 20 to 24 inches. In some places muck is encountered at this same depth, and very often an inch or two of muck immediately overlies the gravel. Considerable mica is found throughout this soil. Along Whitehorse Creek the surface of the type is often slightly sandy, due to the deposition of sand by the creek. This sandy material is never over 6 inches in thickness and has little influence on the agricultural value of the soil.

The Laurel loam occurs as an almost continuous strip along each side of the valley just below the soil washed down from the bluffs. In a few places it extends to the river, but it gives way more often to a gravelly loam or sandy loam soil.

Much of the Laurel loam is covered with water during the wet seasons and as a whole the soil is low, flat, and poorly drained. Only a few small areas were seen that were under cultivation. In general the practicability of drainage is very doubtful, as the fall in many cases is hardly sufficient to carry off the water.

Deposition of material in very slow moving water is the process by which the Laurel loam has been formed. As the river retreated from the edges of the valley there was left an old channel on either side through which water flowed sluggishly when the river was high. This was probably in the nature of a swamp or marsh and gradually this silt deposit was made on top of the river gravels or muck. There is probably some alkali present in this type, but in no case has it accumulated in large enough quantities to injure the wild grasses which naturally cover this soil.

Practically none of the soil is farmed, its principal use being as meadow. The wild grasses yield about 1 ton of hay to the acre. The type is valued at $15 to $30, and rents for 50 cents to $1 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Laurel loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17777	Soil	0.2	3.0	2.6	14.9	14.8	50.3	13.3
17778	Subsoil	.1	1.3	1.7	12.2	16.7	44.9	22.6

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17777, 22.80 per cent; No. 17778, 38 per cent.

LAUREL GRAVELLY LOAM.

The Laurel gravelly loam consists of a brown loam soil 12 to 20 inches deep underlain by river gravel or coarse sand. The average depth of the surface soil is about 18 inches. In the vicinity of the Laurel loam the surface is sometimes of a silty character, while on the better drained areas it frequently contains a large percentage of gravel. Near the rivers there occasionally occurs a phase of this type which has a loam to fine sandy loam surface about 8 inches deep. This is underlain by a rust-colored fine sand, which in turn is usually underlain by a coarse sand or gravel at 24 to 30 inches. This phase generally occurs north of the North Platte River, occupying only small adjacent areas.

This soil usually occurs in strips located in the central part of the valley and running parallel to the rivers. It has been formed by the deposition of a shallow layer of loamy material on the sands and gravels which at one time formed the river beds, and in a more rapidly moving current than that which deposited the silt composing the Laurel loam. Like the loam this soil is low lying and poorly drained. It also is more or less alkaline, but does not contain enough salt to injure the growth of the wild grasses.

The Laurel gravelly loam is seldom cultivated, and like the soil just described is utilized largely as meadow. The water table is in most cases at the surface of the gravelly subsoil, and consequently it will be difficult to drain this type thoroughly. There are a few areas that are high enough to be cultivated, but in such cases the surface is so gravelly that it does not return good yields. Some alfalfa is produced on these higher areas, but the yield is low and uncertain.

Land of this type of soil is valued at $15 to $25, and rents for 50 cents to $1 an acre. It is considered of about the same value as the poorly drained Laurel loam.

The following table gives the results of mechanical analyses of a fine-earth sample of the soil and subsoil of this type:

Mechanical analyses of Laurel gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17769	Soil	4.4	16.6	6.6	13.9	8.8	30.0	18.7
17770	Subsoil	8.2	29.9	13.9	27.3	8.9	5.4	6.4

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17769, 15.05 per cent; No. 17770, 1.32 per cent.

GANNETT FINE SAND.

The surface soil of the Gannett fine sand from 8 to 12 inches consists of a light-brown sandy loam or loamy sand of rather fine texture. The subsoil is a yellowish sand to light sandy loam. Along the outer edge of the type silt loam or muck occurs at 24 to 36 inches, but generally the sandy material has a depth of at least 30 inches.

This soil is found along the north side of the valley, occupying a strip about a half mile wide at the base of the bluff. There is also one small area along the base of the south bluff. This soil is of similar origin to the Osgood fine sandy loam, but differs from that type in that it has been formed from the wash from the sand hills instead of from the loess uplands. The topography is generally level with a gradual slope toward the valley.

The soil is seldom cultivated, most of it being utilized as pasture. It is of too sandy a nature to produce large yields of the cereals. Vegetables should do well on it, however.

It is difficult to determine the value placed upon this soil, since it seldom changes hands except where other types are sold with it. About $10 to $20 an acre would be a fair valuation.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Gannett fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17775.....	Soil.....	0.0	2.8	8.0	49.6	26.0	8.9	5.0
17776.....	Subsoil.....	.0	2.6	7.7	49.7	27.7	5.3	6.4

The following sample contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$): No. 17776, 1.95 per cent.

LAUREL SANDY LOAM.

The Laurel sandy loam to a depth of about 12 inches is a light-brown sandy loam or loamy sand, underlain by a yellowish, lighter sandy loam subsoil. The type is similar to the Gannett fine sand, though generally the sand is of coarser texture. Occasionally silt loam is encountered at 30 inches, while in some cases the subsoil contains a noticeable amount of clay at this same depth, especially where the type is associated with the North Platte loam.

The Laurel sandy loam occurs scattered through the valley, occupying higher areas than the surrounding types. Very often narrow strips of this sandy loam are found along the banks of the rivers, in which case it has been formed by the sand blowing from the river beds in dry periods. Other areas occupy low ridges back from the rivers, and in such cases the soil seems to have been formed along old river

channels, either having been built up by the water depositing the sand or by the wind blowing the sand from these old channels. The sandy loam of these ridges is of a coarser texture than that adjoining the rivers.

The soil is well drained and very often in cultivation. It dries out easily and the crops suffer from lack of water in dry seasons unless irrigated. In a few cases alkali has accumulated in small quantities, but seldom is there enough to injure crops.

Alfalfa and sorghum are the principal crops grown on this soil. The greater part of it is still in pasture and meadow. It is valued at $20 to $30 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Laurel sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
17761	Soil	0.5	9.1	11.9	34.7	23.1	14.8	6.7
17762	Subsoil	1.0	9.0	10.3	31.5	26.2	13.9	8.3

MUCK.

The area classed as Muck consists of 6 to 20 inches of black, decomposed organic matter, underlain by a gray silt loam, a heavy black-clay loam, or by river sand and gravels. The type includes low, marshy areas which are covered with water the greater part of the year. It still supports a rank growth of the native vegetation, consisting of rushes, mosses, cattails, and other aquatic plants. This rank growth has been the source of the large amount of organic matter present in the surface soil. The marshy conditions have preserved it by preventing complete oxidation, and as a result Muck with its black surface of decomposed organic matter is found.

The type in its undrained condition is of little or no agricultural value. A very small percentage is drained well enough to produce swamp hay.

ROUGH STONY LAND.

There are a few small areas of Ogalalla limestone exposed from under the loess along the south side of the valley. This limestone is badly weathered and broken into fragments, which cover the surface so that the land is nearly worthless. These small areas have been mapped as Rough stony land. They are very rough and broken and are of little agricultural value. A scanty growth of grass allows some grazing, but the type can never be put into cultivation.

RIVERWASH.

The Riverwash consists of rather coarse waterworn sand and gravel. The gravel occurs in strips, having been deposited in the more rapid currents. The soil occupies the channel of the South Platte River. Frequently during wet seasons it is entirely submerged, and is washed about and more or less rearranged by the current, while at other times the river dries up entirely and the soil is blown about by the wind. The Riverwash supports no vegetation whatsoever, the sand and gravel being utilized for building purposes and road construction.

IRRIGATION.

The North Platte irrigation canal, which is one of the oldest in the State, was completed in 1884. For ten years subsequent to this practically no construction work was done. In 1893 and 1894 interest was again aroused, and between the years of 1894 and 1896 all the other canals of importance in the area were constructed.

With the exception of the Birdwood and the South Side canals, all those of importance are situated between the two rivers and depend wholly upon the North Platte River for their water supply. Often this supply is inadequate, especially in very dry times, when water is most needed. The South Side Canal, which is at present practically abandoned, has received its water largely from the South Platte River, but it was so planned that when this river was dry it could draw upon the North Platte. This canal has not been used during the last few years, and is now in such poor repair that it would require a large outlay of capital to put it in condition.

The Birdwood Canal extends along the north side of the valley. It receives its water supply from Birdwood Creek, which enters the North Platte Valley about 16 miles west of North Platte. This stream is fed by numerous springs occurring along its course through the sand hills. Often the flow of this stream is not sufficient to supply the water demanded. Water Supply and Irrigation Paper 184, United States Geological Survey, states:

> The discovery of the artesian head of the water in Birdwood Creek makes it possible to augment greatly the low-stage flow of this stream and the supply of water for the existing irrigation canal or a new one. It will not be an expensive matter to sink a number of 12-inch wells to the artesian water at suitable localities along the stream and to provide these wells with gates or valves which can be opened during low stages of flow. It is very probable that the present minimum flow of Birdwood Creek could be doubled by this means.

The following table shows the composition of water taken from several sources in the area. The determinations were made in 1895 by the United States Geological Survey.

Chemical analyses of irrigation water.

[Parts per million.]

Location.	Chlorine.	Alkalinity, as $CaCo_3$.	Hardness, as $CaCo_3$.	Total solids.
North Platte River	11.3	139.5	158	300
Spring at head of West Birdwood Creek	None.	91.5	60	90
Valley of West Birdwood Creek, 7 miles below spring	None.	91.5	58	80
City water works well, North Platte	46.8	192.5	316	600

The object of the study of the underflows of the South Platte Valley carried on by the United States Geological Survey in 1895 was to determine the amount and character of the underflow and whether it was practicable to utilize it for irrigation purposes. The authors make the following statement as the result of this investigation:

The investigations in the South Platte Valley indicate that there is an ample supply of ground water for a large number of small pumping plants located in almost any part of the bottom lands. It is possible to count on an average depth of 40 to 60 feet of good water-bearing gravels. These deposits contain a sufficient amount of coarse material to render it unnecessary to use fine-meshed strainers in the wells. In a large portion of the bottom lands the distance to water is between 5 and 15 feet, making it easy to pump the water and place it on the surface of the ground economically. The cost of pumping will be controlled, primarily, by the cost of fuel and the distance it is necessary to lift the water. Whether the pumping plant will be a profitable investment depends, of course, very largely upon the crops that can be grown and marketed at a fair price.[a]

The present canals, if all in good condition and supplied with a sufficient number of laterals, would allow the irrigation of 50 to 75 square miles in the area, and this includes most of the land possessing sufficient drainage to allow cultivation. There has been little irrigation done the last few years, as the rainfall has supplied sufficient moisture for the crops. Probably 50 per cent of the arable land in the valley can be irrigated at the present time. Practically all of the irrigation is done by the use of shallow surface ditches.

ALKALI.

Alkali in this section of the Platte Valley occurs in harmful quantities only in small areas. All of the soils of the valley run high in soluble salts, and during a number of continued dry seasons it is possible that injurious quantities may accumulate near the surface unless care be taken in the handling of the soil to prevent the continual rise of the salts from below. In the two or three seasons just preceding the soil survey the rainfall was relatively heavy, and it is very probable that at this time the alkali instead of being in the surface is distributed throughout the soil, having been carried down by percolating waters.

[a] Water Supply and Irrigation Paper No. 184, U. S. Geological Survey, p. 29.

The worst affected area of any great extent lies between the rivers in that section reaching 3 or 4 miles west from the town of North Platte. Even in this area good crops are being produced on the greater part of the soils. There are spots varying from a few square rods to 5 or 10 acres in extent scattered through this section that contain large enough quantities of salt in the surface soil to be injurious to most crops. The North Platte loam is unquestionably the worst alkali soil of the area. Injurious quantities occur in small areas along the outer edge of the Osgood fine sandy loam on the south side of the valley. The meadow land, comprising the greater part of the Laurel gravelly loam and the Laurel loam, does not contain injurious quantities of alkali, a concentration of 0.20 per cent seldom occurring in the surface soil. During continued dry weather, however, enough salt may accumulate in the surface of these soils to injure crops, because the ground water is so near the surface and is always impregnated with more or less alkali.

The alkali owes its origin largely to the accumulation of soluble salts carried down the valley by the underflow of the two rivers. The constant rise of this underflow and subsequent evaporation from the surface has caused the accumulation of the alkali in the upper soil. It is also very probable that considerable quantities have accumulated from the wash from the uplands.

The chemical composition of this alkali is variable. From the analyses made of samples of the surface foot it has been found that it consists mainly of the salts of sodium, potassium, and calcium. The sulphate and chloride forms predominate, but considerable carbonate is found in some of the samples. Sodium carbonate, commonly known as black alkali, is seen in only a few very small areas.

Throughout the valley the alkali seems to have a very irregular vertical distribution. During the spring and early summer months, when there is considerable rainfall, the highest concentration is generally found in the second or third foot. In the late summer and fall, as the rainfall becomes less, the constant evaporation brings the salts to the surface, so that from August on through the fall the surface foot generally contains the largest percentage of alkali. In the North Platte loam the highest concentration is very commonly found at the upper part of the heavy clay stratum which so generally forms the subsoil of this type. In order to prevent the increase of the alkali in the upper soil care should be used where irrigation is practiced and excessive amounts of water should not be applied to the land. Thorough and frequent cultivation should be given such crops as corn and sugar beets, in order to keep surface evaporation at a minimum. For this reason these crops should be cultivated as soon after irrigation as the soil can be worked. Many of the small areas now affected can be reclaimed by thorough tilling.

SUMMARY.

The area surveyed has an extent of about 470 square miles, situated wholly in Lincoln County, Nebr. It includes the valley of the Platte rivers from Hershey to Maxwell and extends into the uplands on each side of this valley. The valley is flat and in places poorly drained, while the upland, generally speaking, is rough and hilly and not suitable for cultivation. North Platte is the largest town in the area. The Union Pacific Railroad affords excellent transportation facilities.

The climate is semiarid. The annual precipitation varies from a little over 11 to 30 inches, the average being about 18 inches. There is an exceptionally large proportion of sunshiny days in this section of the State.

The agriculture of this area began to make rapid development between 1880 and 1885. Much of the valley land is irrigated in dry seasons. Stock raising is the leading agricultural industry. Corn, oats, sugar beets, alfalfa, and wild hay are the leading crops. Modern labor-saving machinery is in universal use. A more systematic rotation of crops should be adopted, and a higher appreciation of the value of farm manure should exist among the farmers.

The soils are of a sandy nature. The uplands north of the river consist of typical sand hills. These hills are of Quaternary formation, though the sand was originally deposited during the Arikaree division of the later Tertiary. Along the south bluff is a deep deposit of very fine sandy loess. Back of this, sand hills are again found. Along each side of the valley is a strip of bench land formed by the wash from the uplands. The remainder of the valley consists of loam, sandy loam, gravelly loam, and silt loam soils generally running in strips parallel to the rivers, and of alluvial origin. There is more or less alkali existing in small patches throughout the valley. Twelve types of soil were mapped in the area surveyed.

The Finney fine sandy loam occupies the area of eroded loess on the south upland. It is too rough for cultivation, is used almost wholly for grazing land, and is valued at about $10 an acre.

The Finney loam is locally called "hard land." It produces good crops in favorable years. Wheat yields as high as 35 bushels an acre. The type is valued at about $25 an acre.

The Dunesand is too sandy to be farmed and is used almost wholly as grazing land. It blows badly when the vegetation is destroyed. The type is valued at from $1.50 to $3 an acre.

The Osgood fine sandy loam occupies the bench land in the south edge of the valley. It has been formed by the upland loess washing into the valley. This is a very productive soil, producing large yields of corn, wheat, and alfalfa.

The North Platte loam occupies the higher areas in the valley. It is a very productive soil and is valued as high as $75 an acre. Small areas contain alkali in sufficient quantities to injure crops.

The Laurel loam occupies low, poorly drained areas in the valley and is practically never cultivated.

The Laurel gravelly loam, also a low-lying soil, is utilized mainly as mowing lands.

The Gannett fine sand is too sandy to produce large yields of cereals, though vegetables should do well on it. It is seldom cultivated, the most of it being used for pasture. Its value is about $10 to $20 an acre.

The Laurel sandy loam is well drained and often under cultivation, but in dry seasons crops suffer from drought unless irrigated. Small quantities of alkali are found, but do not materially interfere with the growth of crops. Alfalfa and sorghum are the principal crops. Its value ranges from $20 to $30 an acre.

There are small swampy areas in the valley which have been mapped as Muck. Along the south bluff outcrops of Ogalalla limestone give rise to small areas of Rough stony land. The bed of the South Platte River has been mapped as Riverwash.

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U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP

NEBRASKA
NORTH PLATTE SHEET

SOIL PROFILE
(3 feet deep)

- Laurel gravelly loam — L; Gr s
- Gannett fine sand — Sl; S
- Osgood fine sandy loam — Fsl; Fsl
- North Platte loam — L; Cl
- Laurel sandy loam — Sl; Sl
- Laurel loam — Sil; Sil
- Finney fine sandy loam — Fsl; Fsl
- Finney loam — L; Sil
- Dunesand — S

LEGEND

L Loam
Grs Gravel and sand
Sl Sandy loam
S Sand
Fsl Fine sandy loam
Cl Clay loam
Sil Silt loam

LEGEND

- Lg — Laurel gravelly loam
- Gs — Gannett fine sand
- Ol — Osgood fine sandy loam
- NP — North Platte loam
- Ls — Laurel sandy loam
- Ll — Laurel loam
- Fs — Finney fine sandy loam
- Fl — Finney loam
- Ds — Dunesand
- R — Rough stony land
- M — Muck
- Rw — Riverwash

Soils surveyed by
E.L. Worthen and O.L. Eckman
1907

BASE MAP ENLARGED AND REDRAWN FROM
U.S. GEOLOGICAL SURVEY SHEET

Scale 1 inch = 1 mile
Contour interval 20 feet

Field Operations
Bureau of Soils
1907